

Biospheric Sciences Branch Highlights November - December 2003

**** GIMMS Contribution to UNEP/FAO/UNCCD Sahel Assessment, October 13-16, 2003 in Nairobi, Kenya**

Satellite measurements of the global biosphere in the form of the normalized difference vegetation index (NDVI) have generated a 23-year time series appropriate for the studies seasonal to inter-annual vegetation dynamics of the Sahel region. The close coupling between Sahelian rainfall and the green-up of vegetation has made it possible to utilize this vegetation index data set as a proxy for the land surface response to climate variability. Examination of this time series principally reveals two major periods: (a) 1982-1993 marked by below average vegetation and persistence of drought with a signature large scale drought during the 1983-1985 period; and (2) 1994-2003, marked by a trend towards "greener" conditions with region-wide above normal vegetation conditions in 1994, 1999 and 2003. Spatial patterns enable us to conclude that is not a footprint of desertification, rather they indicated the variability of green vegetation biomass over the region in response to inter-annual variations in rainfall. Analyses of rainfall data indicate increasing rainfall during the same period. However, the greening trend cannot be explained solely by rainfall. While extensive, the greening is not uniform, suggesting that factors other than rainfall may be contributing to greening of some areas and not others. In addition, the resolution of the satellite data set is coarse (8 km). So, the pattern of greening that might help explain its causes may be partly obscured by the resolution of the data. Systematic studies of changes on the landscape at local scales using high spatial resolution satellite data sets such as those from LANDSAT, SPOT and MODIS will allow for an improved documentation of the dynamics of the Sahelian environment.

Results from this study will appear in the Journal of Arid Lands 2004.

**** Biospheric Sciences Branch Paper Accepted by Science**

The manuscript entitled "Continental-scale partitioning of fire emissions during the 1997-2001 El Nino / La Nina period" by GR van der Werf, JT Randerson, GJ Collatz, L Giglio, PS Kasibhatla, A Arellano, SC Olsen, and ES Kasische has been accepted for publication in Science Magazine. The paper describes the use of satellite based measurements of timing and distribution of global fires together with biogeochemical and atmospheric inversion modeling. The results show that, contrary to previous analyses ascribing atmospheric CO₂ variability during ENSO cycles to the balance

between land photosynthesis and respiration, variability in fire emissions accounts for a large part of this variability. Fire also accounts for a lot of the CH₄ variability as well. This is a new example of the use of remote sensing data to constraint atmospheric inversions and of the merging of "top down" and "bottom up" analyses of the global carbon cycle.

**** NPOESS Preparatory Project (NPP) Science Team Meeting,
November 4-6, Annapolis, Maryland**

The new NPP Science Team held its Kickoff Meeting on November 4-6 in Annapolis. Approximately 110 persons participated, with strong representation from the Integrated Program Office (IPO) and Northrop Grumman Space Technology (NGST) as well as the NPP Project Science Group (PSG) led by Bob Murphy (Code 920). After briefings on the program, sensors, and contractors, the 24-member Team outlined concerns and comments on Level 1 testing and algorithms, Level 2+ algorithms and the Operations Concept in parallel splinter sessions. NGST warmly welcomed the Team into the program and expressed interest in pursuing synergistic testing and enhancement of the industry provided algorithms. NGST also stated a willingness to share existing simulation data sets and other resources. ITAR control issues proved to be a particular area of concern, and will be further addressed through PSG and IPO actions. Seven Science Team PIs are based at Goddard, including Chuck McClain, Richard McPeters, Alex Lyapustin, Jon Ranson, Eric Vermote, Robert Wolfe, and Jeff Privette. The University of Maryland provides several additional Team members.

**** ESA's 2003 Medium Resolution Imaging Spectrometer (MERIS)
User Workshop, November 10-13, Frascati, Italy**

The first User Workshop of the ENVISAT MERIS instrument was held November 10-13 in Frascati, Italy. Approximately 150 individuals attended, and most presented results of calibration, validation or research applications conducted with MERIS data. MERIS is a silicon-range pushbroom spectrometer originally designed for ocean color studies. Its great potential has since been exploited for land and atmospheric research. The solid-state instrument appears to be working extremely well, however the Ground Segment has thus far experienced great difficulty in delivering requested scenes (thus far only 'swath data' are -- there are no gridded products). Nevertheless, the narrow user-defineable spectral bands and very high signal-to-noise ratio (14 bits) provide opportunities to better explore some phenomena, such as ocean and land fluorescence and column chlorophyll. Code 923's Jeff Privette co-chaired a session on vegetation monitoring and served on the Scientific Committee. He also participated in the MERIS Science Advisor Group meeting directly following the Workshop. The key

topics were developing a strategy for generating Level 3 land products. SAG members were particularly interested in the MODIS experience in product development, generation and distribution.

**** Biospheric Sciences Branch Administrative Team awarded a GSFC Customer Service Excellence Award**

On October 22, 2003 at the GSFC Awards of Excellence presentation, the Biospheric Sciences Branch Administrative Team was awarded a Customer Service Excellence Award for their support of the Branch. Below are some excerpts from that Award.

"The Administrative team of the Biospheric Sciences Branch has provided outstanding service to both internal and external customers. This team consists of a small group of individuals who handle an incredible amount of work. They ensured that the Branch office ran smoothly for a year and a half after the permanent Branch Head stepped down and there were two rotating acting Branch Heads. The members of this team provide behind-the-scenes support crucial to the scientific work done in the Branch. A great deal of requests for information by upper management to scientists are handled to a great extent by this team freeing up the scientists to concentrate on their research. The amount of work necessary to handle a \$20m budget, greater than \$200k travel budget, controlling several hundred pieces of property, 10 contracts, 20 RTOPS and 35 grants can not adequately be documented here. A huge research effort such as this requires a dedicated, efficient and knowledgeable administrative team. This work can only be accomplished by a fully functional and enthusiastic team focused on the goal of excellence in customer products and services."

Arlene Kerber, NASA
Joanne Santiago, NASA

Gina Baldessari, SSAI
Sandi Bussard, SSAI
Charlie Schnetzler, SSAI

Tonya Fleming, Service Source
Terri Zimmerli, SGT